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**MARKED-UP VERSION**

## WALL CONSTRUCTION USING HOLLOW GLASS BUILDING ELEMENTS

### BACKGROUND OF THE INVENTION

#### FIELD OF THE INVENTION

5        ~~The object matter of the invention is the construction unit pertains to be used in erecting the field of building walls, being an element of the interior decoration, with the application of glass hollow tiles construction. More particularly, the invention pertains to walls with glass hollow tiles for buildings and as elements of the interior decoration.~~

#### ~~The unit~~ DESCRIPTION OF RELATED ART

10        ~~Units for erecting straight or arched walls with the application of cubicoidal glass profiles, mainly hollow tiles, is are known; it consists of a.~~ Different types of units include vertical and ~~a~~ horizontal circumferential slat~~s~~ and horizontal ~~fasteners~~ supports with a length equal to the length of the wall as well as ~~of vertical fasteners~~ supports with a length equal to the height of the hollow tiles. These ~~fasteners~~ supports have ~~a the~~ form of bars or ladders constituting reinforcement elements. In the case of erecting arched walls, both

15        circumferential slats and horizontal ~~fasteners~~ supports are adequately profiled in the prior art to match the wall contour. ~~Reinforcing fasteners, or reinforcing supports~~ are placed in horizontal and vertical gaps between hollow tiles. Such reinforcing ~~fasteners are being~~ supports are typically filled with construction mortar starting from the lower slat~~rows~~, on which the successive rows of hollow tiles are being put; ~~it must be noted that, Introducing~~

20        ends of ~~fasteners are introduced~~ supports into profiled circumferential slats is also known in the art.

25        ~~The unit~~ Units for non-mortar erection of straight walls without the use of mortar, being the ~~element elements~~ of the interior decoration of ~~the an~~ erected building with the application of glass hollow tiles ~~is, are~~ also known. ~~It embraces~~ The glass hollow tiles embrace the supporting ~~element elements~~, which are made of timber. This unit consists of:

~~the~~ Such units include a frame, horizontal slats with a length equal to the length of the wall and fixed to the frame with catches ~~as well as, and~~ vertical ~~fasteners~~ supports with a length equal to the height of the hollow tile. The slats fill in horizontal joints between rows of

hollow tiles, whereas the ~~fasteners~~ vertical supports fill in vertical joints between individual hollow tiles situated in each row. ~~Fasteners~~ Supports tightened between the slats have their lateral side ~~either~~ flat or convex, adjusted to the concave contour of lateral walls of the hollow tile.

5                    ~~According to the invention, the~~ SUMMARY OF THE INVENTION

~~The construction unit for non-mortar erection of building use in erecting both flat and arched profiled walls was designed. This unit consists of supporting elements having a rectangular profile and embracing glass hollow tiles that constitute including the horizontal and vertical fasteners in a supports in the form of joining joined blocks. These fasteners, which on their frontal sides have are provided with longitudinal holes recesses with mortises, which may be formed in a shape of grooved recesses. In the . On their lateral sides of, the vertical fasteners there are supports are provided with transverse holes overlapping with holes made in the recesses of the horizontal fasteners, in which supports. In these holes and recesses, the threaded fasteners combining the entire construction are being mounted. The longitudinal recesses may be given the form of grooved recesses. On both external sides, of the construction unit, profiled slats are preferably fixed to the horizontal and vertical fasteners profiled slats are being fixed, supports. The edges of which the profiled slats are somewhat advanced outside the lateral edges of these fasteners. Profiled slats are being fixed to horizontal and vertical fasteners by means of tongue and groove joints supports. The threaded fastener is composed of preferably a stud-bolt and a longitudinal nut co-operating with it. The Preferably, the horizontal fasteners support has a length preferably (a) equal to the length (b) of the glass hollow tile; whereas. The transverse holes of the vertical fasteners support are situated in relation to the frontal surfaces, contacting each other after the assembly, at a distance (s) from an end of the vertical support equal to the sum of a half of height (h) of the hollow tile and a half of thickness (d) of the horizontal fastener.~~

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~~In order to support. To construct arched pro-filed walls, the unit is provided with distance pads in a the form of tongues, mounted in front of the convex section between the side surfaces of the vertical fasteners support and the frontal surfaces of the horizontal fasteners support.~~

30                    In order to support. To construct arched pro-filed walls, the unit is provided with distance pads in a the form of tongues, mounted in front of the convex section between the side surfaces of the vertical fasteners support and the frontal surfaces of the horizontal fasteners support.

The construction unit according to the invention enables easy assembling of both straight and arched profiled walls of buildings or of their fragments with the application of various construction materials including timber, ensuring on the one hand the appropriate stability and tightness of the whole construction, and on the other hand guaranteeing the high aesthetic qualities being associated with the possibility to functionally operate the light in the interior decoration by means of the adequate selection of glass hollow tiles.

The object matter of the invention is presented in the example of making shown in the figures, where BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1 presents the construction unit within the fragment of the straight wall, constructed with the application of glass hollow tiles from a top perspective view, 1 shows a top perspective view of a construction unit with glass hollow tiles in the fragment of a straight wall.

Fig.2 shows the construction unit in the fragment of the wall from the Fig. 1 without the glass hollow tiles from.

Fig. 3 shows a top perspective view, Fig.3 the of a construction unit in the fragment of the arched profiled wall, erected with the application of the glass hollow tiles from a top perspective view, in the fragment of an arched profiled wall.

Fig.4 shows the construction unit in the fragment of the wall from Fig.3 without the glass hollow tiles from a top perspective view,.

Fig. 5 the horizontal fastener of the unit in shows a longitudinal section, of a horizontal support of the unit.

Fig. 6 the horizontal fastener from the Fig.5 from shows a front side view, of the horizontal support of Fig. 5.

Fig.7 the horizontal fastener from shows a side perspective view, of a horizontal support.

- Fig. 8 ~~the vertical fastener of the unit in~~ shows a longitudinal section, of a vertical support of the unit.
- Fig. 9 ~~shows the vertical fastener~~ support of Fig. 8 in a longitudinal section along the line A-A line according to the Fig. 8, of Fig. 8.
- 5 Fig. 10 ~~the basic vertical fastener from~~ shows a side perspective view, Fig. 11 ~~shorter vertical fastener from a top perspective view,~~ of a basic vertical support.
- Fig. 11 shows a top perspective view of a short vertical support.
- Fig. 12 ~~shows a longitudinal section of a disassembled threaded fastener in a longitudinal section,~~
- 10 Fig. 13 ~~the~~ shows an inside view of a profiled slat from an inside view, Fig. 14, the slat from,
- Fig. 13 in 14 shows a longitudinal section, of the slat of Fig. 15 joining of the horizontal fastener with the vertical fasteners in the fragment of a straight wall in a longitudinal section; Fig. 16 joining of the vertical fastener with the horizontal fasteners in the fragment of a profiled arched wall from a top view; Fig. 17 another embodiment of the 13.
- 15 Fig. 15 shows a longitudinal section of a horizontal support joining with vertical supports in a fragment of a straight wall.
- Fig. 16 shows a top view of a vertical support joining with horizontal supports in a
- 20 fragment of a profiled arched wall.
- Fig. 17 shows an exploded view of the unit construction elements along with the a glass hollow tile from a top perspective unit, Fig. 18 ~~the horizontal fastener of the unit shown in the~~ in another embodiment of the present invention.
- Fig. 17 from a 18 shows a side view of the grooved recesses side view, of the horizontal support of the unit of Fig. 17.
- 25

Fig. 19 shows the horizontal fastener from the Fig. support of Fig. 18 in a W-view from a front side, Fig. 20 the vertical fastener of the unit shown in the view along direction W of Fig. 17 from a grooved recess side view, Fig. 21 the vertical fastener shown in the Fig. 20 in a W1-view from a front side, and Fig. 22 joining of the horizontal fastener with the vertical fasteners shown in the Fig. 17 in the fragment of a straight wall in a horizontal section 18.

The Fig. 20 shows a side view of the grooved recesses of the vertical support of the unit of Fig. 17.

Fig. 21 shows the vertical support of Fig. 20 in a front side view along direction W1 of Fig. 20.

Fig. 22 shows a horizontal section view of a horizontal support joining with vertical supports of Fig. 17 in a fragment of a straight wall.

#### DETAILED DESCRIPTION OF THE INVENTION

A construction unit for non-mortar erection of building walls was designed according to the present invention is provided with the horizontal and vertical fasteners 1 and 2 in a. This unit consists of supporting elements having a rectangular profile and embracing glass hollow tiles that constitute horizontal and vertical supports in the form of joining blocks. These supports have longitudinal recesses with mortises on their frontal sides. The recesses may be formed as holes or in the shape of grooved recesses. In the lateral sides of the vertical supports there are transverse holes overlapping with the recesses in the horizontal supports, in which threaded fasteners are mounted. Profiled slats are fixed to both external sides of the horizontal and vertical supports. The edges of the profiled slats extend somewhat outside the lateral edges of these supports. The profiled slats are fixed to the horizontal and vertical supports by means of tongue-and-groove joints. The threaded fasteners are composed of stud-bolts and longitudinal nuts cooperating with the stud-bolts. The horizontal supports have a length preferably equal to the length of the glass hollow tile. Transverse holes are situated in the vertical support at a distance from an end of the vertical support equal to the sum of a half height of the hollow

tile and a half thickness of the horizontal support. The horizontal support and the vertical support contact each other after the assembly.

In order to construct arched profiled walls, the unit is provided with distance pads, in the form of tongues, mounted in front of the convex section of the wall between side surfaces of the vertical supports and frontal surfaces of the horizontal supports.

The construction unit according to the invention enables easy assembly of both straight and arched profiled walls of buildings or of their fragments with the application of various construction materials including timber, ensuring, on the one hand, the appropriate stability and tightness of the whole construction, and, on the other hand, guaranteeing the high aesthetic qualities associated with the possibility to functionally operate the light in the interior decoration by means of the adequate selection of glass hollow tiles.

Referring to Fig.1 through Fig. 16, a construction unit according to the invention is provided with horizontal and vertical supports 1, 2 in the form of joining blocks having a rectangular or near-rectangular shape and serving as the supporting elements; to which profiled sealing slats 3 are being-fixed. The fastenersupports and slats compose together a rigid framing for all glass hollow tiles, which form the glazing of construction facilities.

The fastenersupports 1-and, 2-, preferably of the same thickness d, are joined together with the threaded fasteners consisting of stud-bolts 4 and longitudinal nuts 5 cooperating with them. These nuts are at the same time also the joints used to fasten together the stud-bolts. The stud-bolts directly fastening the vertical fastenersupports together have such a length, that has been-is adequately adjusted to the length of these fasteners-supports. On the other hand, the stud-bolts fastening the horizontal fasteners together, the horizontal supports, which are separated by the vertical fastenersupports, have a length adequately adjusted to the length of the horizontal fastenersupports and to the thickness of the vertical fastenersupports.

Glass hollow tiles of the luxfer type have external walls of a rectangular shape. The upper, lower, and side walls forming the circumference of the hollow tile have concave surfaces in their central sections. The horizontal fastenersupport 1, having a length  $a$ , preferably equal to the length b of the glass hollow tile and a width slightly lowerless than

the thickness of this tile, has at least one, and has preferably made two, longitudinal holes/recesses 7 for stud-bolts 4. These holes/recesses are broadened at one side and they form recesses 8 for thrust washers 9 and mortises 10 for the nuts 5. In the external sides of the horizontal support through their whole length/length of the horizontal support, recesses are made, forming grooves 11 preferably of a trapezoidal shape.

The vertical fasteners/support 2 has at least one longitudinal hole/recess 12 made in it for the stud-bolt 4, which is situated lengthwise/lengthwise along the vertical axis of symmetry and, which is broadened at one side, and which forms a recess 8 for a thrust washer 9 and a mortise 10 for a nut 5. Additionally, grooves 11 are formed in the external sides on the whole length/recesses are made, forming grooves 11 of the vertical support 2.

Longer and, at the same time, basic vertical fasteners/supports as shown in the Fig. 8, have preferably have a length being which is the sum of the hollow tile height  $h$  and of the horizontal fasteners/support thickness  $d$ ; they. The basic vertical supports have transverse holes 13 in their central section that overlap with the longitudinal holes/recesses of the horizontal fastener/duringsupports in the assembly.

On the other hand—the remaining, shorter vertical fasteners/Additionally, short vertical supports, forming the side framing of the first and the last layer of the hollow tiles in creating the wall, have a length preferably equal to the sum of a half height  $h$  of the hollow tile and the thickness  $d$  of the horizontal fastener. At the bottom of fasteners, as it is shown in the Fig. 11, support. The two transverse holes 13 are made. Transverse at the bottom of the short vertical support, as shown in Fig. 11. The transverse holes of shorter/the basic and longer fasteners/short vertical supports 2 are situated in relation to the frontal surfaces 25, adhering to each other, at a distance  $s$  from an end of the vertical support being equal to the sum of a half height  $h$  of the hollow tile and a half of thickness  $d$  of the horizontal fasteners/support.

Profiled/The profiled slats 3-, having a width being slightly greater than the thickness of the fasteners/horizontal and vertical supports 1 and, 2 and a length adjusted adequately to the lengths of these fasteners, have supports, have a tongue 14 on their inner side the tongues 14. The shape of which/the tongues 14 is adjusted to a/the shape of the



grooves 11 made in the fasteners, with supports, to which they are fastened by means of the a front tongue-and-groove joint 15.

The transverse section of the profiled slats has a polygonal contour with stepped-shaped edges 16, which are advanced a little bit outside the side edges 17 and 18 of the fasteners and reaching 18 of the supports and reach above the outside edges 19 of the hollow tiles, what additionally which stiffens and, at the same time, also seals the joints formed between the hollow tiles.

~~Construction units earmarked~~For construction units of the present invention for erecting profiled walls with a shape approximate to arch with, the application of hollow tiles are provided with horizontal fasteners, in which supports include enlarged longitudinal passage holes/recesses 7 are increased in order to adequately position the stud-bolts 4 during the assembly. These units are additionally provided with distance pads 20 in a the form of tongues with a near-rectangular section, which, as it is shown in the Fig. 16 during the assembly of the fasteners/support, are being placed in the front of the convexly profiled section of the wall, between the side surfaces 21 of the vertical fasteners/support and the frontal surfaces 22 of the horizontal fasteners/support, as well as the side walls of the glass hollow tile.

Preferably on their front sides, the horizontal fasteners/supports have rectangular recesses 23, earmarked on their front sides for mounting the distance pads into them. Such a construction ensures an adequate angular positioning of the fasteners/supports 1 and 2 one in relation to another and erecting each other such that the intended wall profiles of walls are erected, in principle without any strain of on the threaded fasteners, what which ensures the required/necessary stability of walls the wall shape. Respectively to the thickness of pads 20, the The proper profiles of walls with lower or greater convexity can be obtained by adjusting the thickness of the pads 20. Such the a construction solution eases/simplifies the assembly and construction of various profiles without any the necessity to form e.g. the specialized horizontal fasteners/supports in order to receive form a suitable shape of their the frontal sections.

When erecting the free-standing walls are erected inside the a building, the external fasteners/supports are being replaced or additionally reinforced with the frame, which is

5 formed from the vertical and horizontal; uniform elements 24 having ~~a the~~ shape of straps, which are fastened by means of ~~usually-known~~ metal fasteners. Short bolts may be mounted on the frame, the dimensions of which are adjusted to the longitudinal nuts 5; to which then the stud-bolts 4 are being fastened. In the case of arched walls, ~~a the~~ shape of the frame base is adjusted to ~~a the~~ profile of the erected wall.

The horizontal and vertical ~~fasteners-can supports may~~ have, according to the recesses on their circumference, adequately profiled surfaces as ~~it is marked by a indicated~~ by the broken line in the Fig-lines in Figs. 6 and 9, ~~what limits to the minimum which~~ minimizes the possibility to form gaps inside the ~~walls-wall~~ structure.

10 In the case of constructing window openings and, generally, in the case of erecting external walls, gaps occurring between hollow tiles and ~~fasteners-are being supports may~~ be filled in ~~with with~~ a flexible sealing compounds.

15 The ~~A~~ construction unit embracing ~~the one a single~~ glass hollow tile in principle consists of ~~includes~~ two horizontal ~~fasteners-supports~~ (the upper and the lower one), four vertical ~~fasteners-supports~~ (two on each side) and eight threaded fasteners. The eight threaded fasteners are mounted in the longitudinal holes ~~recesses~~ 7 and 12. The number of elements is being selected depending on the number of glass hollow tiles to be used for in the erected wall erection. The ~~A~~ suitable location of the transverse holes 13 makes for this, ~~of the vertical support is such that the vertical fasteners-after assembly supports~~ meet each other after assembly with their frontal surfaces 25 at the height complying with the central section of the hollow tile, ~~and these. The parts of the fasteners-vertical supports that~~ are pulled outside their horizontal edges form the arms embracing the hollow tile situated within the adjacent layer of the wall up to its half dimension.

25 These sections of the ~~fasteners-support~~ that are advanced upwards facilitate the even laying of hollow tiles and the assembly of the next layer. This ensures straight wall construction and guarantees ~~the a~~ suitable stiffness and stability ~~of for~~ the whole construction.

In ~~the another~~ embodiment of the construction unit, as ~~it is presented shown~~ in the Fig. ~~17, 18, 19, 20, 21 and 17~~ through Fig. 22, the longitudinal ~~holes-recesses~~ 7 along with

the mortises 10 of the horizontal fastenersupports 1 have a the form of the grooved  
 recesses 7a with mortises 10a, and the. The longitudinal holesrecesses 12, along with the  
 mortisemortises 10, of the vertical fastenersupports 2 have a the form of the grooved  
 recessesrecesses 12a with the mortisemortises 10a; moreover—such. Moreover, such  
 5 grooved recesses are made through the whole length of the fasteners. In supports. The  
 recesses 8a, in front of the mortises 10a, earmarked for mounting the nuts 5, there are  
 recesses 8a for mounting the thrust washers 9. RecessesThe recesses 7a and, 12a of the  
 horizontal and vertical fastenersupports are provided with a cubicoidal groovegrooves of  
 a width slightly exceeding the diameter of the stud-bolt 4 of the threaded fastener, and  
 10 they are terminated with the bottom 26 having thean arched surface adjusted to the oval  
 shape of the above stud-bolt. The recess-bottom of the recess is made at such thea depth;  
 which enables—such that longitudinal and centric positioning of the stud-bolt; the is  
 enabled. The axis of symmetry of which the recess runs at a depth approximately equal to  
 a half of thickness of the fasteners 1 and supports 1, 2.

15 From thea technological point of view, irrespective of the length of both the  
 horizontal and vertical fasteners, on the whole length we can reach supports, a high  
 precision is reached on the hole in mapping the grooved recesses shape e.g. recess shapes,  
 such as when using milling techniques; what—on. On the one hand—, this guarantees  
 the even-⟨straight⟩ laying of the a stable wall, and—, on the other hand—, it facilitates  
 20 the upward assembly of the above wall due to the possibilityelimination of any prior  
 twisting of the threaded fasteners; and then—when putting on them the block  
 fastenersupports. In order to ensure the appropriate stiffness of the wall; during the  
 upward assembly of the above the vertical fasteners are being supports, each vertical  
 supports is reversed in relation to these fasteners the vertical supports that are laid above  
 25 and below themit by an angle of 180°. Thus, the side opening of the recess 12a of the  
 vertical fastener is beingsupport is situated alternately on the left and on the right side of  
 posts constituting the supporting construction made of the fastenersvertical supports. The  
 horizontal and supports, vertical fastenersupports, profiled slats, and distance pads are  
 made of timber, plastic and/or other construction materials with suitable resistance  
 30 parameters. Adequately selected materials e.g. these, such as those made of timber, ensure  
 at the same time high aesthetic qualities of the walls; in creating thea decorative element  
 in building facilities.

5      The construction units according to the invention make it possible to erect, with the application of glass hollow tiles, partition walls, external walls ~~as well as the~~, and other free-standing decorative screens of large sizes, enabling ~~to functionally operate~~ functional ~~operation of~~ the light subject ~~to with~~ the adequate selection of glass hollow tiles. The unit characterised in the ~~simple~~ construction makes it possible to assemble the walls (both straight and arched profiled ~~ones~~) walls by oneself.